J. New York Entomol. Soc. 100(3):503–509, 1992

BEMBIDION FEMORATUM STURM AND *AMARA COMMUNIS* (PANZER) (COLEOPTERA: CARABIDAE) NEW TO NORTH AMERICA

Yves Bousquet

Centre for Land and Biological Resources Research, Agriculture Canada, Ottawa, Ontario K1A 0C6, Canada

Abstract.—The Palaearctic species *Bembidion femoratum* Sturm and *Amara communis* (Panzer) are reported for the first time from North America. The first species is known from New Brunswick and Nova Scotia since 1967 and the second from New Brunswick since 1988. Both species were probably introduced through nursery stock. A short description and comments are provided for each species.

From a practical point of view, introduced arthropods are important to mankind. Some are pests, others beneficial, and several could have an impact on local fauna by displacing native species or reducing their reproductive success. Early detection of exotic species has been advocated as a national priority in the U.S.A. (Hoebeke and Wheeler, 1983) and a computerized data base on immigrant arthropods has been recently developed (Knutson et al., 1990).

Recent collecting in The Maritimes has yielded two European carabids, *Bembidion femoratum* Sturm, 1825 and *Amara communis* (Panzer, 1797), previously not known to occur in North America. The purpose of this paper is to report the occurrence of these two species on this continent. A short description and comments are provided for each species to assist in their recognition.

Bembidion femoratum Sturm, 1825

Description. Body black, upper surface with faint metallic lustre; elytra with large humeral and apical rufous spots on each side, spots not linked laterally; apical spot usually extending to apex and suture; first antennomere and base of following 2 or 3 antennomeres pale, rufo-testaceous; penultimate maxillary and labial palpomeres and usually also preceding maxillary palpomere infuscated; femora infuscated, tibiae clearly paler than femora. Pronotum with sides less rounded than in *B. tetracolum*; basal punctures shallow, often confluent into longitudinal wrinkles; microsculpture weakly impressed laterally, absent on disc. Elytra parallel-sided; strial punctures smaller than in *B. tetracolum*; punctures of seventh stria distinctly smaller than those of sixth stria; microsculpture rather strong, markedly transverse, not forming distinct meshes. Aedeagus as illustrated (Fig. 1).

Length of body: 4.3–5.0 mm.

Distribution. This species occurs over most of Europe, from Scandinavia south to Spain and Italy (including Sicily), in Asia Minor, and in Siberia east to the Lena River (Lindroth, 1945); it was also reported from Mongolia (Poppius, 1907). In North America, this *Bembidion* is known from Cape Breton Island, continental Nova Scotia, and along the southern coast of New Brunswick. The first specimen collected

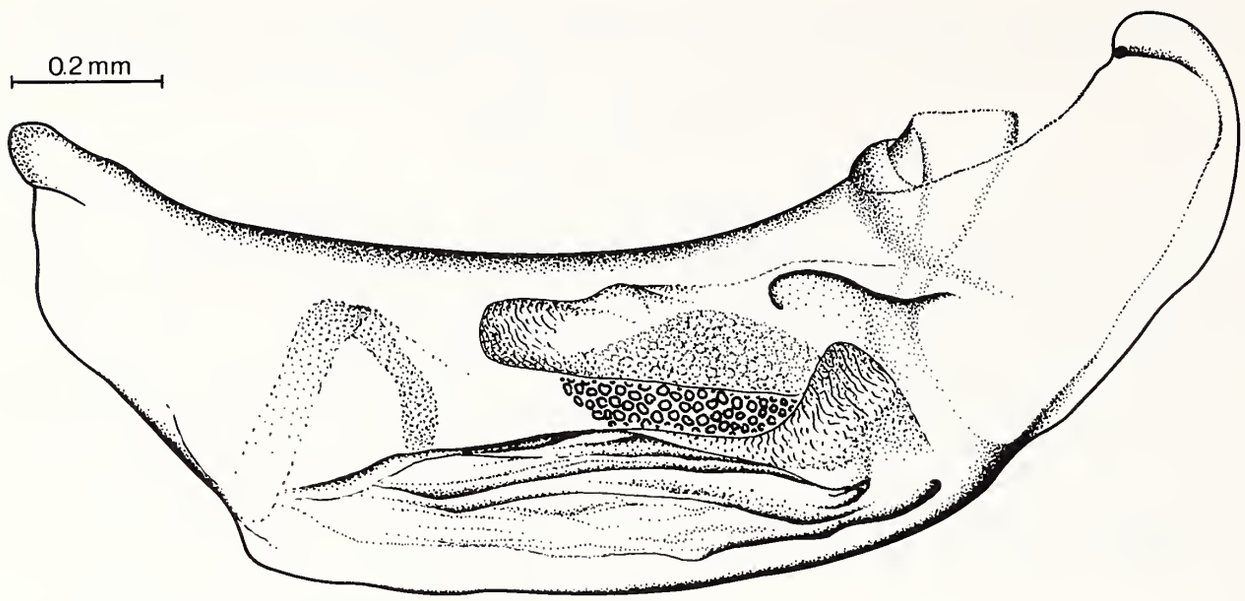

Fig. 1. Median lobe (left lateral view) of *Bembidion femoratum* (Sydney, Nova Scotia).

in the Nearctic Region was found in Lawrencetown near Halifax, Nova Scotia, on July 19–20, 1967. The specimen was identified by C. H. Lindroth in 1971.

New Brunswick. *St. John Co.:* St. John's, 7.VII.1988 (Larochelle & Larivière collection) 4.

Nova Scotia. *Halifax Co.:* Lawrencetown, 19–20.VII.1967 (Canadian National Collection) 1. *Cape Breton Co.:* Sydney, 12.VI.1983 (Canadian National Collection) 14.

Habitat. According to Lindroth (1985), the species occurs in Europe mainly near water, notably on river banks, on clay or clay-mixed sand, silt or gravel, often among sparse vegetation. It is also found, though less frequently, in gravel and clay pits, at roadsides and in cultivated fields, far from water. All North American specimens, except the one from Lawrencetown, were collected under rocks and debris on moderately moist, clayey soil in abandoned fields. At Sydney, it was found with several other European introduced carabids, including *B. tetracolum* Say.

Wing Condition. The wings are fully developed in this species and flight observations have been recorded (Lindroth, 1945).

Discussion. This *Bembidion* belongs to the *tetracolum* group as defined by Lindroth (1963:330–331). It differs from all other North American species of the group, except *B. petrosum attuense* Lindroth, 1963 and *B. poppii* Netolitzky, 1914, which occur in the Nearctic Region only in Alaska, by having the penultimate palpomeres, as well as the second and third antennomeres, infuscated at least apically, and no microsculpture on the disc of the pronotum.

To include this species in Lindroth's key (1963) to the Canadian and Alaskan species of *Bembidion,* the following changes should be made:

151. Pronotum with sides straight or very slightly sinuate toward base .. *B. nevadense* var.
– Pronotum with sides distinctly sinuate toward base 152
152. Seventh elytral stria with punctures as strong as those of sixth stria on basal half. [Alaska] ..... 152′

– Seventh elytral stria with punctures smaller than those of sixth stria on basal half. [Maritime Provinces] ..... *B. femoratum*

152′. Elytral spots poorly defined. Elytral microsculpture consisting of meshes on average less than twice as wide as long. Body length 4.9–5.9 mm ..... *B. petrosum attuense*

– Elytral spots well defined. Elytral microsculpture consisting of meshes more than twice as wide as long. Body length 3.8–4.4 mm ..... *B. poppii*

Bembidion femoratum is morphologically very similar to the European *B. andreae* (Fabricius) (cf. Lindroth, 1985) and has been considered as its subspecies by several authors.

Amara communis (Panzer, 1797)

Description. Body black, upper surface brassy or occasionally greenish or bluish; first two antennomeres and base of third antennomere pale, yellowish, third antennomere infuscated on apical half; palpomeres, except basal ones, piceous to black; femora and tarsi rufopiceous to black, tibiae paler than femora. Head narrow with flat eyes. Pronotum with sides more or less rounded on basal half; anterior angles markedly, angularly produced; basal punctation variable; basal foveae superficial, more or less distinct; posterior lateral seta on each side widely separated from lateral bead. Elytron with striae deepened apically; intervals more convex toward apex; setigerous punctures along eighth stria interrupted near middle; seventh stria with three subapical setae; parascutellar seta absent; microsculpture more or less isodiametric to slightly transverse, rather weakly impressed in male, well-impressed in female. Male hind tibia with setal brush on distal half of medial surface. Female with only two apical setae on last visible sternum. Aedeagus with apical lamella symmetrical, tapered; right paramere with marked hook.

Body length: 6.0–7.5 mm.

Distribution. This species occurs over most of Europe, from Scandinavia south to Spain and Italy, Asia Minor, the Caucasus, and across Siberia to the Kamchatka Peninsula (Lindroth, 1945). In North America, *A. communis* is known from two localities in southern New Brunswick.

New Brunswick. *St. John Co.:* West Quaco, 7.VII.1988 (Larochelle & Larivière collection) 2. *Albert Co.:* Waterside, 8.VII.1988 (Larochelle & Larivière collection) 6.

Habitat. According to Lindroth (1986), this eurytopic species is found on almost every kind of moderately dry soil in meadows, fields and woods, often under moss and dry leaves. The adults feed on plant seeds. The species is a spring breeder.

Wing Condition. The wings are fully developed and functional.

Discussion. *Amara communis* can be distinguished from all other North American species of *Amara* occurring in the northeast by the combination of having the first two antennomeres pale with the third one infuscated at apical half, the femora infuscated, no parascutellar seta, and the seventh elytral stria with three subapical setae.

To include this species in Lindroth's key (1966) to the Canadian and Alaskan species of *Amara,* the following changes should be made to couplets 51 and 54:

51. Shoulder tooth obsolete. Seventh elytral stria with 2 subapical setae 52
– Shoulder tooth often small but distinct. Seventh elytral stria with 3 subapical setae 53

54. Inner basal foveae of pronotum deep, linear and virtually parallel to median line ..

..... *A. aenea*

– Inner basal foveae of pronotum shallow, if linear then somewhat oblique ..... 54'

54'. Elytral striae deepened toward apex, intervals more convex apically. Third antennomere infuscated in apical half ..... *A. communis*

– Elytral striae shallow throughout, intervals quite flat. Third antennomere entirely pale or almost so 55

This species is closely related to the European *A. convexior* Stephens. The latter differs by being more parallel-sided, by the more or less continuous setigerous punctures in the eighth stria and by the somewhat constricted apical lamella of the aedeagus (Lindroth, 1986).

DISCUSSION

With the addition of the two species herein reported, the fauna of northeastern North America now comprises 45 exotic carabid taxa (Table 1). In contrast, 21 introduced species are known from western North America, 15 being common to both sides of the continent (Spence, 1990).

Among the exotic carabids established in eastern North America, all but two were accidentally introduced. *Calosoma sycophanta* (Linné) and *Carabus auratus* Linné were intentionally introduced from Europe to Massachusetts in 1905–1910 for the control of the gypsy moth, *Lymantria dispar* (Linné) (Smith, 1959; Weseloh, 1986). Several other European species of *Carabus* and *Calosoma* were deliberately introduced into eastern North America but only the two above-mentioned species are established.

Bembidion femoratum and *Amara communis* are known in North America only from The Maritimes which probably represent the point of introduction. To be more specific, St. John, New Brunswick, could well be the port of entry for both species. Twenty-three species, about 50% of the exotic carabids found in northeastern North America, were first spotted on this continent in Newfoundland or The Maritimes. There is no doubt that ports in the Atlantic Provinces of Canada have been and are still the primary points of introduction of exotic species in northeastern North America. Other prime introduction areas in the northeast include ports along the Saint Lawrence, particularly Montreal (cf. *Blemus discus, Clivina fossor*), the Great Lakes region (cf. *Trechus quadristriatus,' Bembidion obtusum*), and along the United States coast (cf. *Asaphidion flavipes, Clivina collaris, Harpalus puncticeps, Harpalus rubripes*).

Brown (1940) and Lindroth (1957) claimed that many introduced species in North America crossed the Atlantic with bulk rock and soil regularly taken aboard sailing vessels as ballast. As a rule, ballast was dumped ashore on the North American coast. Because this practice was abandoned after World War I (Lindroth, 1957) and the introductions of *B. femoratum* and *A. communis* are likely of recent origin, the presence of these two carabids in North America cannot be explained by this mode of introduction. So how did these species get here? Spence and Spence (1988), Kavanaugh and Erwin (1985), and Kelton (1983) considered it likely that European carabids and mirids were accidentally introduced to North America through nursery stock. I have no reason not to believe that the two species herein reported also could have been introduced with nursery stock.

Table 1. List of exotic carabid species likely established in northeastern North America.

Introduced species	Area of first record	Year of first record
Abax parallelepipedus (Piller & Mitterpacher)	Cape Breton, NS	1965
Acupalpus meridianus (Linné)	Quebec area, PQ	1969
Agonum muelleri (Herbst)	Newfoundland	<1840
Amara aenea (DeGeer)	?	<1828
Amara apricaria (Paykull)	?	<1875
Amara aulica (Panzer)	Cape Breton, NS	1929
Amara bifrons (Gyllenhal)	Cape Breton, NS	1929
Amara communis (Panzer)	New Brunswick	1988
Amara eyrinota (Panzer)[1]	Newfoundland	1971
Amara familiaris (Duftschmid)	Long Island, NY	1915
Amara fulva (Müller)	Newfoundland	1905
Asaphidion flavipes (Linné)	Long Island, NY	1930
Bembidion bruxellense Wesmael	Newfoundland	1907
Bembidion femoratum Sturm	Nova Scotia	1967
Bembidion lampros (Herbst)	Newfoundland	1949
Bembidion obtusum Audinet-Serville	Great Lakes area	1956
Bembidion properans (Stephens)	Nova Scotia	1947
Bembidion stephensii Crotch	Ottawa, ON	1891
Bembidion tetracolum Say	?	<1823
Blemus discus (Fabricius)	Montreal area, PQ	1933
Broscus cephalotes (Linné)	Cape Breton, NS/ Prince Edward Is.	1987
Calosoma sycophanta (Linné)	Massachusetts	1905–10
Carabus auratus Linné	Massachusetts	1908
Carabus g. granulatus Linné	Montreal, PQ	1952
Carabus g. hibernicus Lindroth	New Brunswick	1890
Carabus nemoralis Müller	New Brunswick	1870
Clivina collaris (Herbst)	Massachusetts	<1838
Clivina fossor (Linné)	Montreal area, PQ	1915
Harpalus affinis (Schrank)	?	<1798
Harpalus puncticeps (Stephens)	Long Island, NY	1954
Harpalus rubripes (Duftschmid)	New Hampshire	1981
Harpalus rufibarbis (Fabricius)	Montreal area, PQ	1953
Harpalus rufipes (DeGeer)	Prince Edward Is.	1937
Laemostenus terricola (Herbst)	Nova Scotia	<1894
Leistus ferrugineus (Linné)	Newfoundland	1977
Notiophilus biguttatus (Fabricius)	Newfoundland	1923
Notiophilus palustris (Duftschmid)	Nova Scotia	1967
Paranchus albipes (Fabricius)	Newfoundland	<1840
Perigona nigriceps (Dejean)	?	<1853
Porotachys bisulcatus (Nicolai)	? Massachusetts	<1900
Pterostichus melanarius (Illiger)	Nova Scotia	1926
Pterostichus strenuus (Panzer)	Newfoundland	1937
Stomis pumicatus (Panzer)[2]	Cape Breton, NS	1984
Trechus quadristriatus (Schrank)	Great Lakes area	1965
Trechus rubens (Fabricius)	Nova Scotia	<1875

[1] The name *eurynota,* used by most authors for this taxon, is an incorrect subsequent spelling.

[2] The first North American record of this species from Hemmingford in Quebec was based on a mislabelled specimen (cf. Bousquet, 1987:124).

To establish the source area of the two species herein reported is impossible. Lindroth (1957) argued that most European carabids introduced before World War I originated from England, particularly the southwestern region, because most of the transatlantic ballast traffic originated from that country. However, for *B. femoratum* and *A. communis* the best guess seems to be Holland. Both species are common in that country (Turin et al., 1977) and Holland has been by far the main source of nursery stock imported from Europe to Canada for at least the past 20 years (Duguay and Anderson, 1986).

ACKNOWLEDGMENTS

I thank A. Larochelle and M.-C. Larivière for making the material in their collection available to me, and A. Smetana and S. Laplante for critically reviewing the manuscript.

LITERATURE CITED

Bousquet, Y. 1987. The carabid fauna of Canada and Alaska: range extensions, additions and descriptions of two new species of *Dyschirius* (Coleoptera: Carabidae). Coleopts. Bull. 41:111–135.

Brown, W. J. 1940. Notes on the American distribution of some species of Coleoptera common to the European and North American continents. Can. Entomol. 72:65–78.

Duguay, C. and R. W. Anderson. 1986. The Canadian cut flower industry. Agriculture Canada, Working Paper 12/86.

Hoebeke, E. R. and A. G. Wheeler, Jr. 1983. Exotic insects reported new to northeastern United States and eastern Canada since 1970. J. New York Entomol. Soc. 91:193–222.

Kavanaugh, D. H. and T. L. Erwin. 1985. *Trechus obtusus* Erichson (Coleoptera: Carabidae), a European ground beetle, on the Pacific Coast of North America: its distribution, introduction, and spread. Pan-Pac. Entomol. 61:170–179.

Kelton, L. A. 1983. Four European species of *Psallus* Fieber found in Canada (Heteroptera: Miridae). Can. Entomol. 115:325–328.

Knutson, L., R. I. Sailer, W. L. Murphy, R. W. Carlson and J. R. Dogger. 1990. Computerized data base on immigrant arthropods. Ann. Entomol. Soc. Am. 83:1–8.

Lindroth, C. H. 1945. Die Fennoskandischen Carabidae: Eine Tiergeographische Studie. I. Spezieller Teil. Kungl. Vetensk. Vitterh. Samh. Handlingar, Ser. B, 4:1–709.

Lindroth, C. H. 1957. The Faunal Connections between Europe and North America. Almqvist & Wiksell, Stockholm.

Lindroth, C. H. 1963. The ground-beetles (Carabidae, excl. Cicindelinae) of Canada and Alaska. Part 3. Opusc. Entomol. Suppl. 24:201–408.

Lindroth, C. H. 1966. The ground-beetles (Carabidae, excl. Cicindelinae) of Canada and Alaska. Part 4. Opusc. Entomol. Suppl. 29:409–648.

Lindroth, C. H. 1985. The Carabidae (Coleoptera) of Fennoscandia and Denmark. Fauna Entomologica Scandinavica, vol. 15, part 1. E. J. Brill/Scandinavian Science Press Ltd., Leiden.

Lindroth, C. H. 1986. The Carabidae (Coleoptera) of Fennoscandia and Denmark. Fauna Entomologica Scandinavica, vol. 15, part 2. E. J. Brill/Scandinavian Science Press Ltd, Leiden.

Panzer, G. W. F. 1797. Faunae Insectorum Germanicae Initia; oder Deutschlands Insecten. Part 40. Nürnberg.

Poppius, B. 1907. Beiträge zur Kenntnis der Coleopteren-Fauna von West-Sibirien und der NW Mongolei. Öfvers. Finska Vet. Soc. Förh. 49 (No. 17):1–24.

Smith, M. E. 1959. *Carabus auratus* L. and other carabid beetles introduced as gypsy moth predators (Coleoptera, Carabidae). Proc. Entomol. Soc. Wash. 61:7–10.

Spence, J. R. 1990. Success of European carabid species in western Canada: preadaptation for synanthropy? Pages 129–141, *in:* N. E. Stork (ed.), The Role of Ground Beetles in Ecological and Environmental Studies. Intercept Ltd., Andover.

Spence, J. R. and D. H. Spence. 1988. Of ground-beetles and men: introduced species and the synanthropic fauna of western Canada. Mem. Entomol. Soc. Can. 144:151–168.

Sturm, J. 1825. Deutschlands Fauna in Abbildungen nach der Natur mit Beschreibungen. V. Abtheilung. Die Insecten. Vol. 6. Verfasser, Nürnberg.

Turin, H., J. Haeck and R. Hengeveld. 1977. Atlas of the Carabid Beetles of The Netherlands. North-Holland, Amsterdam.

Weseloh, R. M. 1986. Biological control of gypsy moths: help from a beetle. Front. Plant Sci. 39:2–3.

Received 3 July 1991; accepted 8 October 1991.